

Application Serial Number 10/038,547

RCE Filed 1/12/2006

Examiner Camquy Truong, Group Art Unit 2195

Attorney Docket Number RA-5368

**Claim Amendments**

It is requested that the following amendments be entered into the Claims:

**Claims 1 - 4 (Cancelled)**

1 5. (Currently Amended). A second stage lottery program for a dispatcher program  
2 that dispatches tasks within an operating system of a computer system, the computer  
3 system supporting at least two classes of said tasks, each of said classes including at  
4 least two levels of said tasks, said dispatcher program to determine which of said tasks  
5 will be assigned to a next available IP resource, said second stage lottery program  
6 comprising:

7 a random number generator and selection program for generating a first random  
8 number for selecting one of said at least two classes, and for generating a second  
9 random number for selecting one of said at least two levels within said selected  
10 class; and

11 a transfer program for ~~transferring control of~~ assigning said next available IP  
12 resource ~~from said second stage lottery program to execute~~ a task assigned to said  
13 selected one of said at least two levels.

1 6. (Currently Amended) The second stage lottery program of claim 5 further  
2 comprising:

3 a level switching routine ~~for handling~~ to handle a failure by said transfer  
4 program to find a task on said selected one of said at least two levels, ~~said level~~  
5 ~~switching routine for selecting a different one of said at least two levels that is~~  
6 ~~associated with a task, and allowing transfer of control to said~~ and to assign said  
7 next available IP resource to a task associated with said a different one of said at  
8 least two levels.

1 7. (Previously Amended) The second stage lottery program of claim 5 wherein any  
2 one of said at least two levels is two times more likely to be selected than a next lower  
3 one of said at least two levels.

1 8. (Currently Amended) The second stage lottery program of claim 7 wherein tasks  
2 within each level of said at least two levels ~~will have tasks of like quantum values,~~  
3 ~~wherein each of said quantum values defines an amount of time a task will be assigned~~  
4 ~~to said next available IP resource~~ for a same amount of time as other tasks in said level.

1 9. (Currently Amended). The second stage lottery program of claim 5 wherein each of  
2 said tasks ~~has~~ is respectively associated with an a quantum value, said quantum value  
3 ~~identifying a computer system specific amount of time in which~~ said each of said tasks  
4 ~~with said quantum value~~ may continuously execute on an ~~instruction processor~~ IP  
5 ~~resource,~~ and wherein said second stage lottery program employs a quantum bias  
6 routine, ~~said quantum bias routine~~ comprising:  
7 a data capture routine for determining how much of an ~~allotted segment of said~~  
8 associated amount of time quantum value a task that has executed used a task  
9 executes on said IP resource before returning control to said dispatcher; and  
10 a bias adjustment routine for adjusting said ~~allotted segment of said quantum value~~  
11 amount of time associated with said task based on how ~~much of said allotted~~  
12 ~~segment was used~~ long said task last executed on said IP resource.

1 10. (Currently Amended). The second stage lottery program of claim 9 wherein said  
2 bias adjustment routine does not adjust said amount of time associated with current  
3 ~~allotted segment to a new allotted segment for said task if use of said allotted segment~~  
4 execution of said task was interrupted by an interrupt.

1 11. (Canceled)

1 12. (Currently Amended) A computer system having a quantum timer ~~settable~~ to allow  
2 ~~processing on an IP resource for a limited duration of~~ to be assigned to process one or  
3 more tasks, ~~the computer system~~ also having ~~an operating system having~~ a dispatcher  
4 program wherein ~~whereby~~ all said tasks are ~~identifiable~~ identified as being members of  
5 classes, ~~and wherein said dispatcher program comprises~~ comprising:  
6 a) a scheduler ~~code section executable~~ to determine for how long, and to  
7 which of said one or more tasks, an IP resource will be next assigned; and  
8 b) a scheduler queue from which said one or more tasks may be assigned  
9 ~~addressable and assignable~~ to said IP resource, wherein  
10 said scheduler ~~code section has~~ provides a two stage lottery execution  
11 algorithm, a first stage ~~of said two stages~~ using a lottery process for ~~determining~~  
12 to select one from which class of said classes ~~a next one of said one or more~~  
13 ~~tasks will be selected~~, said a second stage of said two stages using a second  
14 lottery process to select from said selected class a level, wherein said scheduler  
15 selects a task that will next be assigned to said IP resource from said selected  
16 level of said selected class ~~a class determined by said first of said two stages~~.

1 13. (Previously Amended) The computer system set forth in claim 12 wherein said first  
2 stage chooses a class randomly from among all said classes using a bias settable by a  
3 user.

1 14. (Previously Amended) The computer system set forth in claim 12 wherein the  
2 number of said classes is selectable by a user.

1 15. (Currently Amended) The computer system as set forth in claim 12, wherein ~~if any~~  
2 ~~one of said any tasks is of a~~ any tasks included within one or more predetermined  
3 classes are class "above the lottery line" then ~~said any one of said any tasks is~~ assigned

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4 an IP resource prior to ~~running~~ said scheduler providing said two stage lottery  
5 ~~section.~~

1 16. (Currently Amended) The computer system as set forth in claim 12, wherein if the  
2 scheduler ~~code section's first of two stages~~ selects a class that does not have ~~which is~~  
3 ~~empty of said any said tasks as members,~~ said scheduler ~~code section next~~ chooses  
4 another class ~~of available classes.~~

1 17. (Currently Amended) The computer system as set forth in claim 12, wherein if  
2 none of the classes has any of said any tasks as members, said scheduler ~~code~~ selects  
3 a ~~very~~ low priority level operating system task.

1 18. (Currently Amended) The computer system as set forth in claim 12, wherein said  
2 second stage lottery comprises:  
3 a random number generator and selection program for generating a random number  
4 and for selecting ~~a one of said at least two levels~~ said selected level within said selected  
5 class based upon ~~a correspondence of said thereby generated~~ random number; and  
6 a transfer program for causing said IP resource to begin execution of transferring  
7 ~~control from said second stage lottery program to a task found on a task assigned to~~  
8 said selected level ~~one of said at least two levels.~~

1 19. (Currently Amended) A method for use by a dispatcher ~~algorithm in an operating~~  
2 ~~system in of~~ a computer system for selecting a task to provide with an available  
3 instruction processor resource, wherein the task may be selected from one or more  
4 classes, each of which may have one or more priority levels, wherein said method  
5 comprises:

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6           determining whether ~~within a scheduler queue~~ there are any task pointers  
7       ~~tasks~~ within said priority levels of said classes of tasks on said ~~scheduler queue~~,  
8       ~~and if so, determining whether any said any task pointers are that are~~ above a  
9       second stage lottery line, and if so assigning a first of said tasks ~~of said any tasks~~  
10      ~~indicated by said any task pointers above said second stage lottery line~~ to said  
11      available instruction processor resource; but if not,

12           and if there is only one said priority level having any tasks, ~~of said any~~  
13      ~~task pointers~~, assigning a first of said any tasks from said only one priority level  
14      ~~corresponding to said any task pointers at said only one said priority level~~ to said  
15      available instruction processor resource; else,

16           running a first stage of a second stage lottery algorithm to select one of  
17      said classes, and running a second stage of said second stage lottery algorithm  
18      to select a priority level from said selected class, ~~one of said classes a priority~~  
19      ~~level and selecting a task from which to select said task~~ said selected priority  
20      level to provide to said available instruction processor resource.

1   20.   (Currently Amended) A method for use by a dispatcher ~~algorithm~~ in an operating  
2   system ~~in of a computer system~~ for selecting a task ~~from one or more classes to provide~~  
3   ~~with to assign to~~ an available instruction processor resource, said task being selected  
4   from one or more classes of tasks, each having one or more priority levels, wherein said  
5   method comprises:

6           ~~determining whether within a scheduler queue there are any task pointers~~  
7      ~~within priority levels of a class of tasks on said scheduler queue, and if so, and~~  
8      if there is only one of said priority level levels having any ~~of said any task pointers~~  
9      tasks, assigning a first of said any tasks ~~corresponding to said any task pointers~~  
10     ~~at said only one said priority level~~ to said available instruction processor  
11     resource, else,

12           running a second stage lottery algorithm, a first lottery stage of said lottery  
13      algorithm to select one of the ~~plurality of~~ said classes, and a second lottery stage

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14 of said lottery algorithm to select from said one of said classes a priority level  
15 from which to select a task to assign to said available instruction processor  
16 resource.

1 21. (Currently Amended) The method of claim 20 further comprising:  
2 ~~moving said task pointers within priority levels of said one or more classes~~  
3 ~~on said scheduler queue, wherein each priority level can maintain a chain of said~~  
4 ~~task pointers and wherein there are more than one of said priority levels, said~~  
5 ~~task pointer moving process comprising:~~  
6 ~~maintaining a task assigned quantum which identifies for each task on~~  
7 ~~said scheduler queue a set~~ respectively associating each task with an amount of  
8 time said task is entitled to be assigned to said instruction processor resource to  
9 ~~which said each task is entitled upon being assigned to said instruction processor~~  
10 ~~resource;~~  
11 placing said each task into a any one of said priority level levels based  
12 upon a ~~value in said task assigned~~ associated amount of time quantum for said  
13 ~~each task; and~~  
14 moving a task from a current priority level to a different changing said  
15 ~~each task priority level based on how much of said value in said task assigned~~  
16 ~~quantum for said each task said each associated amount of time said task used~~  
17 ~~a last time said each task was assigned to said available instruction processor~~  
18 ~~resource.~~

1 22. (Currently Amended) The method of claim 21, and said moving step further  
2 comprising: ~~determining whether said each task priority level should be changed~~  
3 ~~based on said last time said each task was assigned to said available instruction~~  
4 ~~processor resource whereby~~  
5 if said task did not complete execution last time said task was assigned to said

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6 available resource, did not complete within said task assigned quantum, moving said  
7 task from said current priority level to a next lower said task priority level for said task by  
8 one priority level and increasing said associated amount of time by a predetermined  
9 amount raise said value of said task assigned quantum by a factor of 2,

10 if said task used less than all, but more than a predetermined portion, of said  
11 associated amount of time last time said task was assigned to said available resource,  
12 used less than said value of said task assigned quantum but more than a small portion  
13 of said task assigned quantum, leave leaving said priority level and said associated  
14 amount of time small portion the same, and

15 if said task used less than said predetermined portion of said associated amount  
16 of time last time said task was assigned to said available resource, used less than said  
17 small portion of said value of said task assigned quantum, increase moving said task  
18 from said current priority level to a next higher said priority level of said task by one and  
19 decreasing said associated amount of time by a predetermined amount halve said task  
20 assigned quantum value of said task.

1 23. (Currently Amended) The method of claim 21 wherein each task is represented  
2 by a task pointer stored on a scheduler queue said task assigned quantum is assigned  
3 for said each task prior to a said task pointer being on said scheduler queue.

1 24. (Currently Amended) The method of claim 21 wherein a said first stage lottery  
2 algorithm selects which of said classes of tasks on said scheduler queue will have has  
3 tasks assignable to said available instruction processor resource.

1 25. (Currently Amended) The method of claim 21, further comprising:  
2 if any of said tasks are in classes above a lottery line, providing said available  
3 instruction processor resource to said tasks in said classes above said lottery line in a  
4 predetermined priority order, and otherwise

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5        ~~using wherein a said first stage lottery algorithm selects to select~~ which of said  
6        ~~classes of tasks on said scheduler queue will have tasks assignable to said available~~  
7        ~~instruction processor resource, but only if there are no tasks in classes above a first~~  
8        ~~lottery line, and if there are tasks in said classes above said first lottery line, providing~~  
9        ~~said available instruction processor resource to said tasks in classes above said first~~  
10       ~~lottery line in a priority order.~~

1       26. (Currently Amended) A dispatcher system for use within a computer system, said  
2       computer system having an available instruction processor resource and a scheduler for  
3       storing pointers to tasks, each to be assigned ~~quantums of to~~ said instruction processor  
4       resource for an amount of time associated with said task, said dispatcher system  
5       comprising:  
6                a first stage of a two stage lottery system for using a random number generator  
7                to select one of multiple classes of tasks; and  
8                a second stage of said two stage lottery system for selecting a task from said  
9                selected one of said multiple classes, whereby said selected task is assigned to an  
10       available said instruction processor resource ~~for a portion of a quantum assigned to said~~  
11       amount of time associated with said selected task.